What is claimed is:

1. A microporous polyolefin membrane with the fine fibrils, composed of (A) a polyolefin having a weight-average molecular weight of 5×10^5 or more or (B) a composition containing this polyolefin, connected to each other, wherein its average pore size is 0.05 to 5μm, and the crystal lamellas of the polyolefin inclined at an angle θ of 80 to 100° to the plane constituting the membrane account for at least 40% of the total lamellas both on the section cut in the mechanical direction and on the section cut in the direction perpendicular to the mechanical direction and in the thickness direction.

2. The microporous polyolefin membrane according to Claim 1, wherein said polyolefin (A) has a weight-average molecular weight of 1×10^6 to 15×10^6.

3. The microporous polyolefin membrane according to Claim 1, wherein said polyolefin composition (B) is composed of an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of 1×10^6 to 15×10^6 and a polyolefin having a weight-average molecular weight of 1×10^5 or more but less than 1×10^6.

4. The microporous polyolefin membrane according to Claim 1 or 3, wherein said polyolefin composition (B) contains an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of 7×10^5 or more at 1 weight % or more.

5. The microporous polyolefin membrane according to one of Claims 1 to 4, wherein said polyolefin (A) or polyolefin composition (B) has a weight-average molecular weight/number-average molecular weight

ratio (Mw/Mn) of 300 or less.

6. The microporous polyolefin membrane according to one of Claims 1 to 4, wherein said polyolefin (A) or polyolefin composition (B) has a weight-average molecular weight/number-average molecular weight ratio (Mw/Mn) of 5 to 50.

7. The microporous polyolefin membrane according to one of Claims 1 to 6, wherein said polyolefin (A) or polyolefin for said composition (B) is polypropylene or polyethylene.

8. The microporous polyolefin membrane according to Claim 1 or one of Claims 3 to 7, wherein said polyolefin composition (B) is composed of an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of 5×10^5 or more, high-density polyethylene and polymer for giving a shut-down property, said polymer for giving a shut-down property being selected from the group consisting of low-density polyethylene, polyethylene having a weight-average molecular weight of 1,000 to 4,000 and melting point of 80 to 130°C, and ethylene-based copolymer having a melting point of 95 to 125°C and produced in the presence of a single-site catalyst.

9. The microporous polyolefin membrane according to one of Claims 1 to 8, wherein the following relationships hold for $r(TD) = \cos^2 TD(b)/\cos^2 MD(b)$ and $r(MD) = \cos^2 ND(b)/\cos^2 MD(b)$, defined by X-ray analysis of the microporous polyolefin membrane:

$$100 \geqq r(TD) \geqq 1.3$$

$$100 \geqq r(MD) \geqq 3.5$$

$$1.0 > \cos^2 ND(b) \geqq 0.45$$

10. The microporous polyolefin membrane according to one of Claims 1 to 9, wherein said crystal lamellas inclined at said angle θ of 80 to 100° to the membrane surface account for at least 70% of the total lamellas.

11. A method of producing a microporous polyolefin membrane, comprising the steps of extruding the solution, composed of 10 to 50 weight % of (A) a polyolefin having a weight-average molecular weight of 5×10^5 or more or (B) a composition containing this polyolefin and 50 to 90 weight % of a solvent, into a gel-like formed article; thermally setting the article, with or without stretching, at least at the crystal dispersion temperature of said polyolefin (A) having a weight-average molecular weight of 5×10^5 or more or said composition (B) containing this polyolefin, but at melting point of said polyolefin (A) having a weight-average molecular weight of 5×10^5 or more or said composition (B) containing this polyolefin plus 30°C or lower; and removing the solvent.

12. The method of producing a microporous polyolefin membrane according to Claim 11, wherein said polyolefin (A) has a weight-average molecular weight of 1×10^6 to 15×10^6.

13. The method of producing a microporous polyolefin membrane according to Claim 11, wherein said polyolefin composition (B) is composed of an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of 1×10^6 to 15×10^6 and a polyolefin having a weight-average molecular weight of 1×10^5 or more but less than 1×10^6.

14. The method of producing a microporous polyolefin membrane according

to Claim 11 or 13, wherein said polyolefin composition (B) contains an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of 7×10^5 or more at 1 weight % or more.

15. The method of producing a microporous polyolefin membrane according to one of Claims 11 to 14, wherein said polyolefin (A) or polyolefin composition (B) has a weight-average molecular weight/number-average molecular weight ratio (Mw/Mn) of 300 or less.

16. The method of producing a microporous polyolefin membrane according to one of Claims 11 to 14, wherein said polyolefin (A) or polyolefin composition (B) has a weight-average molecular weight/number-average molecular weight ratio (Mw/Mn) of 5 to 50.

17. The method of producing a microporous polyolefin membrane according to one of Claims 11 to 16, wherein said polyolefin (A) or polyolefin for said composition (B) is polypropylene or polyethylene.

18. The method of producing a microporous polyolefin membrane according to one of Claims 11 to 17, wherein the following relationships hold for $r(MD) = \cos^2 ND(b)/\cos^2 MD(b)$ and $r(TD) = \cos^2 ND(b)/\cos^2 TD(b)$, defined by X-ray analysis of the microporous polyolefin membrane:

$$100 \geqq r(TD) \geqq 1.3$$

$$100 \geqq r(MD) \geqq 3.5$$

$$1.0 > \cos^2 ND(b) \geqq 0.45$$

19. The method of producing a microporous polyolefin membrane according to one of Claims 11 to 18, wherein said polyolefin composition (B) is composed of a polyolefin having a weight-average molecular weight of 5

$\times 10^5$ or more and polyolefin having a weight-average molecular weight of 1,000 to 4,000 and melting point of 80 to 130°C.

20. The method of producing a microporous polyolefin membrane according to Claim 11 or one of Claims 13 to 18, wherein said polyolefin composition (B) is composed of (B-1) an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of 5×10^5 or more and (B-2) a polyolefin having a weight-average molecular weight of 5×10^5 or less, the (B-2)/(B-1) weight ratio being 0.2 to 20.

21. The method of producing a microporous polyolefin membrane according to Claim 11 or one of Claims 13 to 18, wherein said polyolefin composition (B) is composed of a polyolefin having a weight-average molecular weight of 5×10^5 or more and polypropylene having a weight-average molecular weight of 3×10^5 or more.

22. The method of producing a microporous polyolefin membrane according to Claim 11 or one of Claims 13 to 18, wherein said polyolefin composition (B) is composed of a polyolefin having a weight-average molecular weight of 5×10^5 or more and ethylene-based copolymer having a melting point of 95 to 125°C and produced in the presence of a single-site catalyst.

23. The method of producing a microporous polyolefin membrane according to Claim 11 or one of Claims 13 to 18, wherein said polyolefin composition (B) is composed of 1 to 69 weight % of an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of 7×10^5 or more, 98 to 1 weight % of a high-density polyethylene, and 1 to 30 weight % of a low-density polyethylene.

24. The method of producing a microporous polyolefin membrane according to one of Claims 11 to 23, wherein stretching said gel-like article is an essential step.

25. The method of producing a microporous polyolefin membrane according to Claim 24, wherein said gel-like article is stretched, and thermally set at the stretching temperature or higher but at melting point of said polyolefin (A) or polyolefin composition (B) plus 30°C or lower.

26. The method of producing a microporous polyolefin membrane according to Claim 24, wherein said stretching step is effected at an areal ratio of 15 to 400.

27. A battery separator which uses the microporous polyolefin membrane according to Claim 1.

28. A battery which uses the microporous polyolefin membrane according to Claim 1 for its separator.

29. A filter which uses the microporous polyolefin membrane according to Claim 1.